

Lucas Busta

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Highlights

- Nine years research laboratory experience. Excellent skills in chemical analysis including data acquisition, processing, visualization, interpretation, and archival.
- Flexible and dedicated hard worker with exceptional organizational skills and attention to detail.
- Collaborates with domestic and international research groups and individuals with excellent communication and interpersonal skills to successfully accomplish project goals on time.
- Capable of carrying out multiple projects simultaneously, enabling concomitant pursuits of existing projects, collaborative undertakings, exploratory experiments, and written works.
- Six years hands-on experience maintaining, repairing, and documenting instrumentation and lab equipment: GC-FID, GC-MS, HPLC-ESI-MS, and gas delivery systems.

Professional Preparation

2016-... **Post-Doctoral Research Associate** University of Nebraska - Lincoln
2011-16 **Ph.D. Chemistry** University of British Columbia
2007-11 **B.Sc. Chemistry, Biochemistry and Molecular Biology (dual major)** University of Minnesota - Duluth

Teaching

Training in Education

2016 **Instructional Skills Workshop.** Active and participatory learning and teaching techniques 24 hrs.
2016 **Writing Across the Curriculum Workshops.** Literature-based methods for teaching scientific writing . 7 hrs.
2015 **Teaching Assistant Peer-Mentor Training.** Skills in facilitation, mentorship, and teaching 6 hrs.
2011 **Teaching Assistant Training.** Basic skills for teaching assistants in scientific laboratories 12 hrs.

Teaching Experience

Guest Lecturer

2017 **U. Nebraska - Lincoln: Biochemistry 843 - "The plant cuticle"** 50 min. lecture
2017 **U. Nebraska - Lincoln: Biochemistry 843 - "Membrane hemifusions"** 50 min. lecture
2016 **U. British Columbia: Chemistry 319 - "Practical skills for chemical research"** 30 min. lecture

Professional Tutor

2016-... **Chemistry and Biology Tutor:** Recruited by OneClass.com; online subscription-based tutoring for university courses.

Teaching Assistant

2016 **Analytical Chem. Lecture:** Lecture hall tutorials, Blackboard® quizzes, office hrs. 90 students. 1 semester
2015 **Analytical Chem. Lab:** Instrument design, operation. Analytical methods. 6–12 students. 1 semester
2013/14 **Organic Chem. Lab:** Basic chemical reactions and work-ups. 15 students. 2 semesters
2012/13 **Analytical Chem. Lab:** Instrument design, operation. Analytical methods. 6–12 students. 2 semesters
2011/12 **First Year Resource Centre:** Tutored general chemistry students. 5–10 students. 2 semesters
2009-11 **Analytical Chem. Lab:** Quantitation, spectrochemistry, chromatography. 20 students. 4 semesters

Mentoring Experience

2012-... **Laboratory Skills Mentor:** Trained others in the use of chromatographic and mass spectrometric instrumentation, chemical separation, and basic chemical reactions: one visiting professor (YanJun Guo), four graduate students (Daniela Hegebarth, Yulin Sun, Alberto Ruiz, Evan LaBrant), and one undergraduate student (Cassie McDonald). 8 hrs. ea.
2015 **Teaching Assistant Mentor:** Coached teaching assistants new to advanced courses. 2 mentees. ... 1 semester

Technical Skills

GC-EI-MS, GC-FID: Advanced user *Diverse metabolite analysis*
LC-ESI-MS(/MS): Intermediate user *Lipid analysis*
R: Advanced user *Statistical computing and graphics, bioinformatics*
Bioinformatics and sequence analysis programs: Intermediate user *Transcriptome assembly and analysis*
D3 Javascript visualization libraries: Intermediate user *Interactive data visualization for complex datasets*
Git(hub), HTML, CSS: Intermediate user *Website and blog design*
LabVIEW: Advanced user *Custom data acquisition and processing*
L^AT_EX: Advanced user *Professional typesetting and document generation*

Research

Research Training

2017 **Metabolomics Workshop** (UNL Center for Biotechnology and Waters) 9 hrs.
2017 **Social Media and Communicating Science** (UNL Research Administration Management Program) 2 hrs.
2017 **Workshop on Budget Development** (UNL Research Administration Management Program) 2.5 hrs.
2017 **Write Winning Grant Proposals** (UNL Grant Writing Seminars) 7 hrs.
2016 **Bioinformatics for Evolutionary Biology** (UBC Biology 525D) 20 hrs.
2016 **R Carpentry Workshop** (Basics of statistical computing in R) 12 hrs.
2012 **Physical and Analytical Chemistry Seminar** (UBC Chemistry 540A) 24 hrs.
2012 **Principles of Chemical Separation** (UBC Chemistry 534) 72 hrs.
2011 **Bioanalytical Chemistry** (UBC Chemistry 533) 72 hrs.
2011 **Advanced Bioorganic Chemistry** (UBC Chemistry 569) 72 hrs

Research Experience

Collaborative Research

2017-... Asst. Prof. Dylan Kosma, U. Nevada - Reno. GC-MS and qPCR studies on polyacetylene biosynthesis.
2015-... Dr. Ulrike Bauer, U. of Bristol. GC-MS and ToF-SIMS analyses of pitcher plant surfaces. [9]
2015-... Dr. Olga Serra Figueras, U. de Girona. GC-MS analysis of cork waxes. [8]
2015-... Prof. Yuelin Zhang, UBC. GC-MS analysis of amino acids. [3]
2012-... Asst. Prof. Jessica Budke, U. Tenn.-Knoxville. GC-MS analysis of moss cuticular waxes. [1, 2]

Postdoctoral Research

2016-... **Research area: Specialty Lipid Biosynthesis in Crop Species**
advisor: Dr. Edgar Cahoon, Director *Center for Plant Science Innovation, Lincoln, NE.*
- Cloned and heterologously expressed fatty acid metabolism genes
- Analyzed specialty lipids in cell cultures
- Implemented transcriptome assembly pipeline and developed transcriptome analysis toolkit

Doctoral Research

2011-16 **Thesis title: "The Diversity and Biosynthesis of Plant Cuticular Waxes"**
advisor: Dr. Reinhard Jetter, Departments of Chemistry and Botany *University of British Columbia.*
- Detailed chemical analyses of hundreds of plant wax lipid extracts
- Chemical synthesis of authentic standards for structure elucidation and enzyme assay
- Extensive literature review and biosynthetic analysis of specialty plant surface lipids

Laboratory Experience

- Experience with GC-MS, GC-FID, LC-ESI-MS, ToF-SIMS, and NMR.
- Improved, implemented, and documented chromatography and MS equipment maintenance routines.
- Constructed and maintained literature and measurement databases for the research group.
- Developed custom data analysis software to increase throughput, facilitating collaboration with domestic and foreign research groups.

Undergraduate Research

2008-11 **Development of a time-domain reflectometry system for monitoring ice formation on bridge decks**
advisor: Dr. John Evans, Department of Chemistry and Biochemistry *University of Minnesota - Duluth.*
- Developed LabVIEW data acquisition and processing software to process time-domain reflectometry signals.

Presentations

Conference Presentations

- 2017 **Lucas Busta**, Evan LaBrant, Edgar Cahoon: "Structure and biosynthesis of bioactive polyacetylenes", Poster, NEBRASKA RESEARCH & INNOVATION CONFERENCE: PREDICTIVE CROP DESIGN: GENOME TO PHENOME, Lincoln, NE
- 2017 **Lucas Busta**, Evan LaBrant, Edgar Cahoon: "Structure and biosynthesis of bioactive polyacetylenes", Poster, NEBRASKA SYMPOSIUM ON PLANT BREEDING, Lincoln, NE
- 2016 **Lucas Busta**, Reinhard Jetter: "Structure and biosynthesis of branched cuticular wax compounds", Poster, PHYTOCHEMICAL SOCIETY OF NORTH AMERICA, Davis, CA
- 2015 **Lucas Busta**, Jessica M. Budke, Reinhard Jetter: "Cuticular waxes from the leafy gametophyte, sporophyte, and calyptra of the moss *Funaria hygrometrica*", Oral Presentation, BOTANICAL SOCIETY OF AMERICA, Edmonton, AB
- 2013 **Lucas Busta**, Jessica M. Budke, Reinhard Jetter: "Hydroxy esters from the gametophyte, sporophyte, and calyptra of the moss *Funaria hygrometrica*", Oral Presentation, PHYTOCHEMICAL SOCIETY OF NORTH AMERICA, Corvallis, OR
- 2011 **Lucas Busta**, Evan Anderson, John F. Evans: "Development of a Time Domain Reflectometry System for the Determination of Ice Formation on Road and Bridge Surfaces", Oral Presentation, SPRING UNDERGRADUATE RESEARCH SYMPOSIUM, University of Minnesota Duluth, Duluth, MN

Invited Presentations

- 2016 **Lucas Busta** "The diversity and biosynthesis of cuticular waxes." Special seminar, THE BOYCE THOMPSON INSTITUTE, Ithaca, NY.
- 2016 **Lucas Busta** "The diversity and biosynthesis of cuticular waxes." Special seminar, THE CENTER FOR PLANT SCIENCE INNOVATION, Lincoln, NE.

Publications

- in review* [8] Yanjun Guo, **Lucas Busta**, Reinhard Jetter*. "Cuticular waxes from five fern species" ANNALS OF BOTANY
- 2017 [6] Yanjun Guo[†], **Lucas Busta**[†], and Reinhard Jetter*. "Composition of cuticular wax differs among organs of *Taraxacum officinale*." PLANT PHYSIOLOGY AND BIOCHEMISTRY, *in press*
- 2017 [5] **Lucas Busta*** and Reinhard Jetter. "The structure and biosynthesis of branched wax compounds on *Arabidopsis thaliana*." PLANT AND CELL PHYSIOLOGY, *in press*
- 2016 [4] **Lucas Busta**[†], Daniela Hegebarth[†], Edward Kroc, Reinhard Jetter*. "Changes in cuticular wax coverage and composition on developing Arabidopsis leaves are influenced by wax biosynthesis gene expression levels and trichome density." PLANTA, 245(2): 297-311
- 2016 [3] Pingtao Ding[†], Dmitrij Rekhter[†], Yuli Ding[†], Kirstin Feussner, **Lucas Busta**, Sven Haroth, Shaohua Xu, Xin Li, Reinhard Jetter, Ivo Feussner, Yuelin Zhang*. "Systemic Acquired Resistance Deficient 4 encodes a key enzyme for pipecolic acid biosynthesis." THE PLANT CELL, 28(10): 2603-2615
- 2016 [2] **Lucas Busta**, Jessica M. Budke, Reinhard Jetter*. "Cuticular wax coverage on *Funaria hygrometrica* is similar to vascular plants, but wax composition differs between surfaces of the leafy gametophyte, calyptra, and sporophyte capsule." ANNALS OF BOTANY, 118(3): 511-22
- 2016 [1] **Lucas Busta**, Jessica M. Budke, Reinhard Jetter*. "Identification of β -hydroxy fatty acid esters and primary, secondary-alkanediol esters in cuticular waxes of the moss *Funaria hygrometrica*." PHYTOCHEMISTRY, 121: 38-49

Manuscripts in preparation

- in prep* [7] **Lucas Busta** and Reinhard Jetter. "The structural diversity and biosynthesis of specialty plant wax compounds"

[†]co-first authors

*corresponding author

in prep [8] Olga Serra, **Luke Busta**, Mercè Figueras, Marisa Molinas, Irene Peré, Reinhard Jetter, Ok Tae Kim. "Cuticular waxes and wax biosynthesis gene expression from *Quercus suber* and *Quercus ilex*"

in prep [9] **Lucas Busta**, Reinhard Jetter, and Ulrike Bauer. "Fine-tuning of epicuticular wax crystal slipperiness in a carnivorous pitcher plant"

Awards

2016 **F. and M. Loewus Student Travel Award:** (\$200) *Phytochemical Society of North America*
2015 **Graduate Student Travel Award:** (\$500) *University of British Columbia*
2013 **Best Oral Presentation Award:** (\$250) *Phytochemical Society of North America*
2011 **Casmir Ilenda Award for Outstanding Undergraduate Research** *Univ. MN - Duluth*
2011 **F.B. Moore Academic and Leadership Award** *Univ. MN - Duluth*
2010 **American Chemical Society Undergraduate Analytical Chemist of the Year** *ACS*
2010 **Maguire Award for Most Promising Chemistry Student** *Univ. MN - Duluth*
2009 **Maguire Award for Most Promising Chemistry Student** *Univ. MN - Duluth*

Service and Other Skills

Academic Service and Outreach

Ad hoc reviewer

2017-... **Plant Cell Reports**

Volunteering

2017 **Graduate Student Poster Fair Judge**

2017 **Women In Science:** Volunteered as part of an event that brought young women from rural high schools to the university lab to perform small experiments and learn about plant chemistry and plant biotechnology. 4 hrs.

Digital media

2016-... **Plants Are Chemists:** My blog with stories about phytochemistry in plants' and humans' daily lives. Written for the lay reader. plantsarechemists.blogspot.com

2015 **Dreading drought:** Interviewed by undergraduate students for a course project in SCI300: Communicating Science <https://www.youtube.com/watch?v=GFMkaePIoDM>

2011 **Facing the Challenge: Climate Change:** With the honors program, helped organize a day-long series of panel sessions, debates, and presentations to stimulate discussion, awareness, education, and action in response to climate change.

Societies

2017-... **NPA** National Postdoctoral Association

2013-... **PSNA** Phytochemical Society of North America

Languages

Spanish (Castellano) Fluent in reading, writing, speaking

References

Research

- Dr. Edgar Cahoon, Director
 - Center for Plant Science Innovation
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Lincoln, NE 68588
 - 402 472 5611
 - ecahoon2@unl.edu
- Dr. Reinhard Jetter, Professor
 - Biological Sciences Building
6270 University Boulevard
Vancouver, BC Canada V6T 1Z4
 - 604 822 2477
 - reinhard.jetter@botany.ubc.ca
- Additional references available upon request

Teaching

- Dr. Robin Stoodley, Senior Instructor
 - Department of Chemistry
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 - 604 827 5829
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- Dr. Dan Bizzotto, Professor
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